
Halele‘a Forest Reserve

Management Plan

September 2010

Prepared by:

State of Hawai‘i
Department of Land and Natural Resources
Division of Forestry and Wildlife
Forest Management Section

EXECUTIVE SUMMARY

This management plan for Halele‘a Forest Reserve is one in a series of site-specific plans to be prepared by the Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) for individual forest reserves in the State of Hawai‘i. These plans present a brief history of the specific forest reserve, a complete record of land transactions and boundary changes over time, a description of cultural and natural resources, as well as an account of infrastructure and intended use(s) of the area. Plans will serve to: (1) assist in preparation of regulatory compliance documents required to implement management actions outlined in the plan; (2) support DOFAW efforts to secure funding for plan objectives; (3) prioritize implementation of management objectives; and (4) solicit requests for proposals or bids to implement plan objectives.

Halele‘a is Kaua‘i’s first forest reserve; it was established by Governor’s Proclamation in 1905 for the purpose of forest and watershed protection. The area is characterized by deep, wide valleys, abundant streams, and heavy rainfall. In addition to its rich biological and cultural resources, Hanalei Valley provides many downstream users with an abundant source of water.

DOFAW’s current management objectives for Halele‘a Forest Reserve include management of Okolehau Trail, monitoring invasive plants/animals, enhancement of native rare plant resources, maintenance of *Pritchardia* enclosure(s), and management of the pig hunt.

Management priorities were divided into eight categories and ranked on a qualitative basis. Summaries of management priorities and State funds budgeted for planned management projects in Halele‘a Forest Reserve are as follows:

1. Watershed Values – Staff and management costs;
2. Native Ecosystems – \$100,000 plus staff and management costs;
3. Invasive Species Control - \$32,000 annual costs plus variable helicopter time and staff and management costs;
4. Resource Protection - \$13,500 annual costs plus staff and management costs;
5. Additional Public Activity – Staff and management costs;
6. Threatened and Endangered Species Management - \$83,000 annual costs plus \$2500 biennial costs;
7. Game Animal Management – Staff and management costs plus variable costs to be determined;
8. Commercial Activity – Staff and management costs.

Details of these priorities and costs can be found in Table 4 on page 29 of the plan.

This plan is intended to describe short-term resource management planning and implementation strategies, as well to serve as a basis for future updates to accommodate evolving or additional objectives such as additional fencing projects and developing improved access and facilities for the Forest Reserve.

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HALELE'A FOREST RESERVE
MANAGEMENT PLAN SIGNATURE PAGE

Kaua'i District certification: This plan was prepared by a team of Division of Forestry and Wildlife (DOFAW) staff to provide a management framework for Halele'a Forest Reserve.



Galen Kawakami – Acting DOFAW Kaua'i Branch Manager

8/17/10
Date

DOFAW Administrator's approval: I have reviewed the enclosed Forest Reserve Management Plan and concur with the recommendations herein. I agree that this Management Plan will serve as a guiding document for the resource management of Halele'a Forest Reserve.



for Paul J. Conry – DOFAW Administrator

9/22/10
Date

Department of Land and Natural Resources Board approval: This plan meet the criteria established for State Forest Reserve Management Plans as mandated by Chapter 183, Section 16-4, Hawai'i Revised Statues.



Laura H. Thielen – DLNR Chairperson

Approved by the Board of Land and Natural Resources at its meeting held 9/22, 2010

DEVELOPMENT PROCESS TIMELINE

Halele‘a Forest Reserve, Kaua‘i

| Stage of Development | Date Achieved | Comments |
|-----------------------------|----------------------|--|
| Branch review | February 2010 | Incorporated |
| DOFAW review | April 2010 | Incorporated |
| Partner agency consultation | May 2010 | <ul style="list-style-type: none"> • One comment received from targeted community organization • Two comments received from partners and other government agencies |
| Public consultation | July 2010 | One comment received. |
| DOFAW approval | September 2010 | None |
| BLNR approval | September 2010 | None |

I. INTRODUCTION

The Division of Forestry and Wildlife (DOFAW) conducts on-going planning efforts to develop and update management plans for all forest reserves across the State. These efforts, to be consistent across the State, serve to organize field management, assist in budgeting and funding concerns, and aim to make the process transparent for partner organizations and the public. These plans also help to fulfill certain recommendations made in the Hawai'i Tropical Forest Recovery Action Plan, which came about as a result of the 1992 Federal Hawai'i Tropical Forest Recovery Act.

Each Branch office of the Division will have one comprehensive management plan that addresses overall Forest Reserve System issues, goals and objectives for that Branch. In addition, management plans will be developed for individual forest reserves, which will in part reflect the Division's management guidelines specific to that area. This document represents the comprehensive management plan for Halele'a Forest Reserve, which fits under the overall forest reserve management plan for Kaua'i Branch. It addresses concerns and strategies only on the public lands in Halele'a Forest Reserve.

This management plan for the Halele'a Forest Reserve was developed using a variety of methods. Initial development consisted of reviewing and analyzing DOFAW historic and current files (both at the Administrative and Kaua'i Branch office) and documents obtained from other State agencies including the Land Division, Survey Division, Bureau of Conveyances, as well as State Archives. State of Hawai'i Geographic Information Systems (GIS) map layers relating to biological, historical, and environmental resources were referenced to develop this plan. Additional resources utilized included other plans that identified the Forest Reserve or the area. Examples include the Hawaiian Forester and Agriculturalist, the Hawai'i Biodiversity and Mapping Program, Hawai'i's Comprehensive Wildlife Conservation Strategy, U.S. Fish and Wildlife Service Recovery Plans and others. The plan then evolved into its final iteration through discussions with Division staff from all program areas both at the Branch and Administrative offices, other Divisions and State agencies, DOFAW partners, and the public.

Approval of this Halele'a Forest Reserve Management Plan by the Chairperson of the Board of Land and Natural Resources may trigger the following actions:

1. Preparation of regulatory compliance documents as required for implementation of management actions as outlined in the plan.
2. DOFAW efforts to secure operational and planning funding for plan objectives.
3. Prioritized implementation of plan objectives by DOFAW.
4. Periodic solicitation of requests for proposals or bids for implementation of plan objectives, including issuance of permits, licenses, or contracts (Hawai'i Administrative Rules §13-104-22), as necessary.

II. HALELE‘A FOREST RESERVE DESCRIPTION

Halele‘a Forest Reserve currently consists of approximately 15,000 acres of public land. The Reserve was created by Governor’s Proclamation on August 24, 1905; the object of the Reserve was “to protect the forest on the Halele‘a water shed” (Hosmer 1905).

Table 1. Government Tax Map Key (TMK) parcels currently comprising public lands of Halele‘a Forest Reserve.

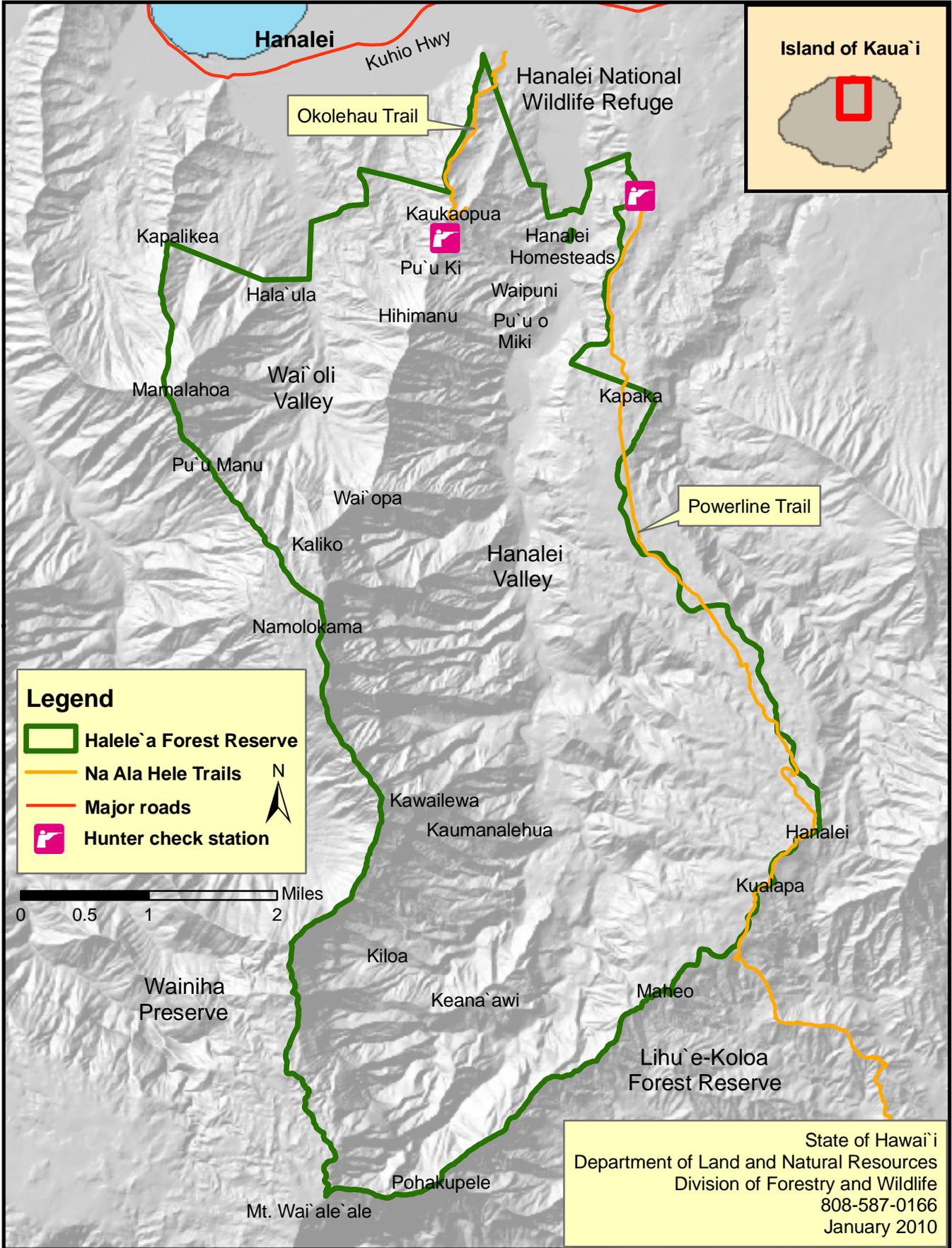
| TMK Number | Owner | Tax Acres (entire TMK) | GIS Acres (entire TMK) | GIS Forest Reserve Acres |
|--------------|------------------|------------------------|------------------------|--------------------------|
| 456001001 | State of Hawai‘i | 2295 | 2365.8 | 2365.8 |
| 454001001 | State of Hawai‘i | 11,852 | 12,075.1 | 12,075.1 |
| 453001003 | State of Hawai‘i | 480.18 | 460.2 | 460.2 |
| 454002047 | State of Hawai‘i | unknown | 11.9 | 11.9 |
| 454002021 | State of Hawai‘i | unknown | 2.1 | 2.1 |
| 454002018 | State of Hawai‘i | 15.82 | 2.5 | 2.5 |
| 454002016 | State of Hawai‘i | unknown | 6.0 | 6.0 |
| 454002034 | State of Hawai‘i | 8.94 | 31.2 | 13.2 |
| 454002002 | State of Hawai‘i | 72.0 | 67.8 | 67.8 |
| TOTAL | | | | 15,004.6 |

A. Location and Description: Halele‘a Forest Reserve is located in north central Kaua‘i (Figure 1); the public lands of the Forest Reserve lie within the ahupua‘a of Wai‘oli and Hanalei. The area is characterized by deep, wide valleys, abundant streams, and heavy rainfall.

B. Geographic Site Data: Kaua‘i is the oldest of the main Hawaiian Islands and was formed approximately five million years ago by at least one extinct volcano (Juvik and Juvik 1998). A second, smaller volcano may have formed the southeast part of the island, but erosion, weathering, landslides, and rejuvenated flows have made it difficult to ascertain the island’s history. An enormous caldera complex and the lack of rift zones make the geology of Kaua‘i unique among the Hawaiian Islands. Kaua‘i is known for its deeply weathered mountains and associated landscapes (e.g. Waimea Canyon and the Nāpali coast) and its wet climate. Mount Wai‘ale‘ale, on the south edge of Halele‘a Forest Reserve, is arguably the wettest place on Earth, with an annual rainfall of over 450 inches.

C. Physical Site Data: The public lands of Halele‘a Forest Reserve contain all or parts of the following features: Wai‘oli Stream (falls), Kapalikea peak, Hala‘ula peak, Māmalahoa peak, Pu‘u Manu, Nāmolo-kama Mountain, Kaukaopua peak, Pu‘u Ki, Waipuni peak, Pu‘u o Miki, Kapaka, Hanalei River (dam), Hihimanu peak, Wai‘opa, Kaliko peak, Pekoa Stream (falls), Ka‘āpahu Stream (falls), Kawailewa peak, Kaumanalehua peak, Ka‘iwa Stream, Kīloa peak, Ka‘āpoko Stream (dams), Waipuna‘ea Stream (falls), Hanalei peak, Kualapa peak, Maheo peak, Keana‘āwī Ridge, and Pohakupele peak (USGS drg topo map GIS layer). Average annual rainfall ranges from under 100 inches per year at the makai boundary of the Reserve to over 300

Figure 1: Halele`a Forest Reserve (current extent of public lands) and associated features



inches on the mauka slopes towards Mt. Wai‘ale‘ale (Figure 2). Elevation ranges from 100 feet in Hanalei Valley to approximately 5000 feet approaching the peak of Mt. Wai‘ale‘ale

D. Pre-Reserve and Early Use History: Halele‘a is Kaua‘i’s first Forest Reserve. When it was created in 1905, the Territorial Forester noted that the rugged topography of the area “renders artificial forest protection unnecessary but there are portions of the District where man can assist Nature. For this reason the Reserve is created.” (Hosmer 1905). The Governor’s Proclamation that created the Forest Reserve included approximately 37,500 acres of land, 26,500 of which were privately owned (Table 2). Original boundaries of the Reserve encompassed much of the land in the ahupua‘a of Wainiha, Lumaha‘i, Waipā, Wai‘oli, Hanalei, and Kāhiliwai. Only Hanalei and Wai‘oli (approximately 11,000 acres) were owned by the Territorial government and much of Hanalei Valley was originally excluded due to the potential for agricultural development. Lands at Lumaha‘i and Waipā were owned by Bishop Estate and Kāhiliwai was owned by Hon. A. S. Wilcox. The report accompanying this initial Proclamation states that vegetation on open ridges and the lower grazing belt was covered in great patches of uluhe (*Dicranopteris linearis*), while on lower slopes, the forest was open and filled with masses of ‘ie‘ie (*Freycinetia arborea*), which rendered it almost impenetrable. Forest trees in the area were described as being largely *Ohia lehua* in mixture with other trees. The exact nature of vegetation on the higher ridges was uncertain due to inaccessibility. The potential development of water power in the area was referred to and it was noted that the stream in Wainiha Valley was already being harnessed to supply power to plantations in southwest Kaua‘i.

Historical files relating to Halele‘a Forest Reserve reveal other interesting information. A 1929 letter to the Territorial Forester stated that Bishop Estate trustees were of the opinion that there was no forest reserve in Waipā. Addition of the upper portion of Hanalei Valley in 1930 cancelled plans for a rubber plantation; it was decided that the “forest jungle” already in place was of greater value for water conservation. Discussion about a surrender agreement between the Territory and Wainiha Hui/Alexander & Baldwin, Ltd. for the lands at Wainiha began in 1933; the hui was required to build a fence further up the valley from the current Forest Reserve boundary line, which would provide an additional 421 acres for pasturage in exchange for a 15-year surrender of the remainder of Wainiha. In addition to this area, grazing permission was given on other parcels of private lands within the Forest Reserve, including Kāhiliwai and Lumaha‘i. Fencing issues and ensuing cattle trespass was a recurrent theme over the years. A current issue is ongoing debate over public access to the Reserve with some residents of Hanalei Valley.

Figure 2: Hydrologic features of Halele`a Forest Reserve

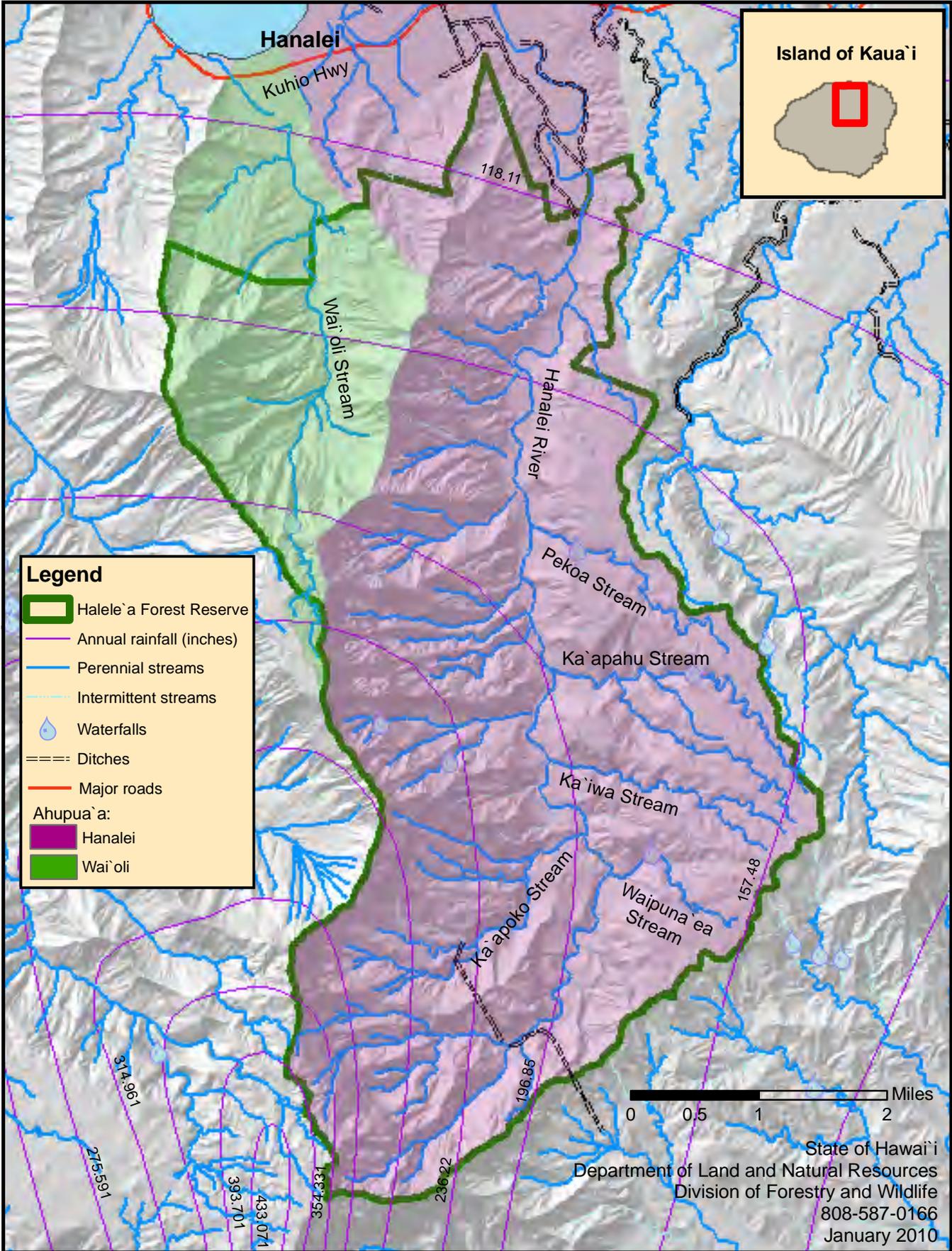


Table 2: Summary of public land additions and withdrawals (A/W) for Halele‘a Forest Reserve. See Figure 3 for map descriptions. Data relating to these items are filed at the DOFAW Administrative Office and the State Survey Office.

| Action | Date | A/W | Description | Acres | Copy of Survey Furnished (CSF) | Tax Map Key |
|-------------------------|-------------|-----|--|--|--------------------------------|---|
| Governor’s Proclamation | 24-Aug-1905 | A | Land set aside for establishment of Halele‘a Forest Reserve | ~37,500 (only Govt. lands included are those at Hanalei and Wai‘oli) */1 | 1628 | 414001003 (por) 452001003 452001004 452022025 (por) 453001003 (por) 454001001 (por) 456001001 (por) 456001002 456002001 (por) 456003001 (por) 457001001 457001002 457002001 (por) 458001001 458002002 (por) 458003001 458003002 458003003 (por) 458003004 Plus many small parcels at Kāhiliwai |
| Governor’s Proclamation | 17-Oct-1930 | A | Modification of Boundary | 2220 | 5513 | 414001003 (por) 452001003 452001004 454001001 454003001 (por) 456001001 456001002 457001001 457001002 458001001 458002002 (por) 458003001 458003002 Plus 19 small parcels at Kāhiliwai |
| Executive Order 3227 | 16-Mar-1984 | A | Addition of a portion of Hanalei Homesteads, portion of Hanalei River, and Grant 9499 (part 2) | 568 | 19838 | 453001003 454002002 454002016 454002018 454002021 454002034 (por) 454002047 |

| Action | Date | A/W | Description | Acres | Copy of Survey Furnished (CSF) | Tax Map Key |
|----------------------|--------------|-----|--|--------|--------------------------------|-------------|
| Executive Order 4242 | 25-Sept-2008 | W | Withdrawal of private lands at Wainiha | 10,120 | 24572 | 458001001 |

*/1 Proclamation states 40,500 acres including approximately 3000 acres in Hanalei Valley that are excluded from the Reserve as agricultural land.

Kuleana Parcels: The public lands of Halele‘a Forest Reserve currently enclose one Kuleana parcel (TMK 454002017) along the Hanalei River.

Documented Activities/Leases/Deeds/Permits: Intermittent land use agreements affecting Halele‘a Forest Reserve have occurred over the years (Table 3).

Table 3. Land use agreements associated with Halele‘a Forest Reserve.

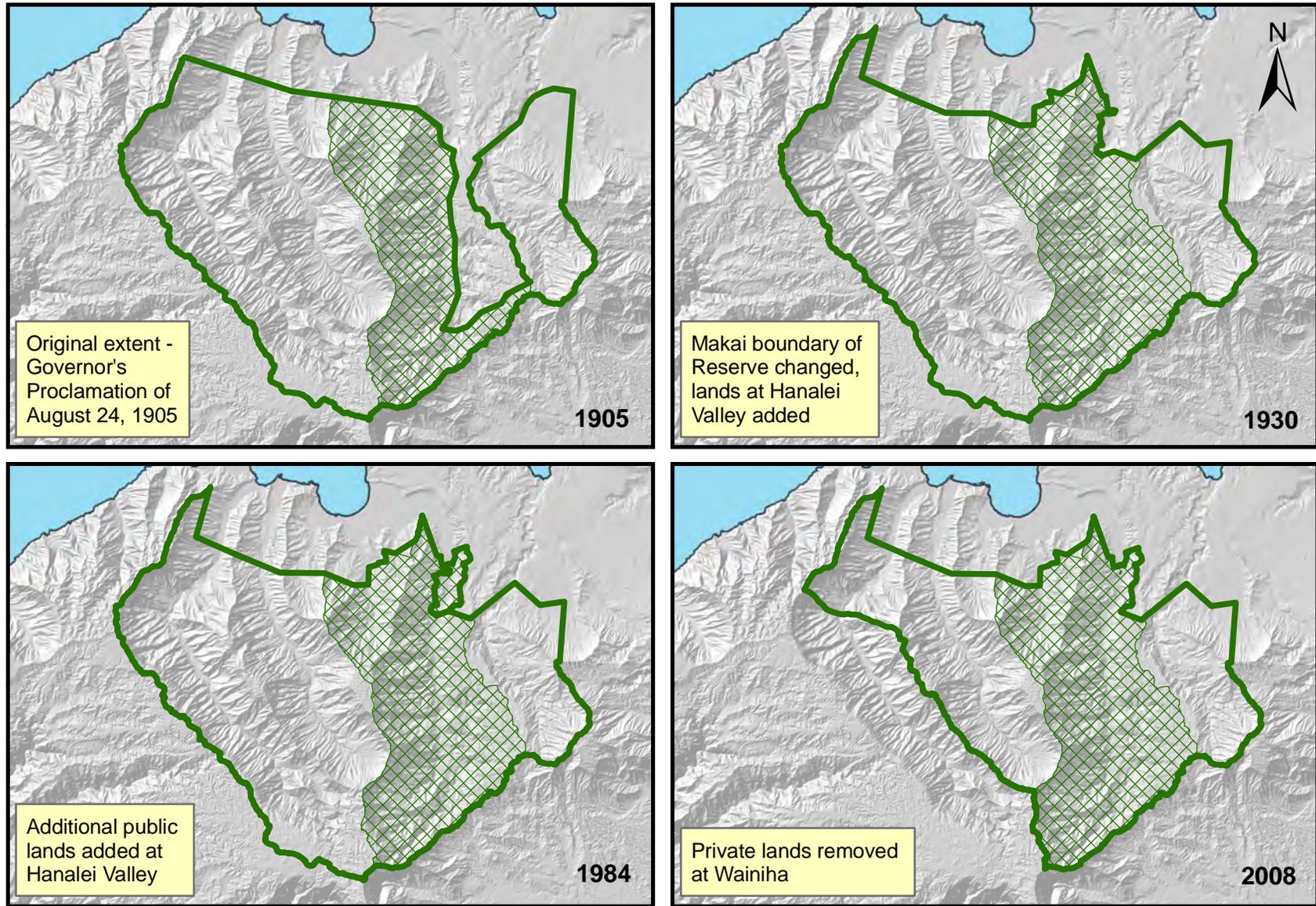
| Type of Action | Action Number | Duration | Description | Acres | Copy of Survey Furnished (CSF) | Tax Map Key */1 |
|------------------------|---------------|----------------------------|--|--------------|--------------------------------|---|
| Agreement of Surrender | n/a | 10-Feb-1948 to 09-Feb-1968 | McBryde Sugar Company Limited; Wainiha | 10,120 | n/a | unspecified |
| General Lease | S-3894 | 25-Jan-1965 to 24-Jan-1985 | Edward Tanaguchi; Lots 2, 3, 26-A, 27-A, 29-A, & 30-A at Hanalei Homesteads – cancelled (effective date 17-May-1969) | 13.53 | n/a | 5-4-02 |
| General Lease | S-3940 | 16-Nov-1965 to 15-Nov-2030 | McBryde Sugar Company Ltd./Kaua‘i Island Utility Coop; right-of-way for electrical transmission line | 74.38 */2 | 12941 12942 12943 | 5-3-01 5-4-01 3-5-01, 02 4-2-01 2-3-01, 02, 03, 04, & 12 2-4-01 |
| Agreement of Surrender | n/a | 14-Feb-1969 to 13-Feb-1989 | McBryde Sugar Company Limited; Wainiha | 10,120 | n/a | 5-8-01 |
| Agreement of Surrender | n/a | 07-Jun-1989 to 06-Jun-2009 | McBryde Sugar Company Limited; Wainiha (terminated 16-Nov-2007) | 10,120 | n/a | 5-8-01 |

*/1 TMK formatting is sometimes not specific or consistent in historical documents

*/2 Line has 4 sections; sections 1-3 cross portions of Halele‘a Forest Reserve

E. Vegetation: The vegetation in Halele‘a Forest Reserve follows a trend that is seen in many of the State’s forest reserves – exotic vegetation in makai areas and valley bottoms, with increasing

Figure 3: Historical boundary changes at Halele`a Forest Reserve - also see Table 2.



Extent of Halele`a Forest Reserve
Public lands

0 2.5 5 10 Miles

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808-587-0166
January 2010

quality of endemic vegetation towards mauka areas and on cliff sides (Figure 4). According to DOFAW's 2001 Draft Management Guidelines, Halele'a Forest Reserve contains all four levels of vegetation classification (Figure 5): Highest Quality Native Ecosystems (V-1), Predominantly Native Areas (V-2), Considerably Disturbed Areas (V-3), and Badly Degraded Areas (V-4). V-1 units consist of the highest quality native ecosystems and communities, having minimal disturbance and low levels (less than 10%) of non-native plants in any vegetative layer. V-2 units consist of areas in which native plants predominate in communities that are relatively intact and are minimally disturbed. They have a significant component of non-native plants (more than 10%). V-3 units consist of areas that have a considerable amount of disturbance. The vegetation in these areas does not reflect a naturally evolved species composition, but rather a mixture of small remnant patches dominated by native plants, patches of largely invasive weedy alien plants, and areas of mixed native and non-native plants. V-4 units are areas that are severely degraded or highly altered from their natural state. They may be lands that were cleared for other uses, or are currently eroded, forest plantations, or are dominated by non-native species.

Management objectives for exceptional quality V-1 areas are to protect and perpetuate them by preventing non-sustainable activities or intensities of use. Permitted activities in these areas are minimally disruptive, and would be focused on ecosystem restoration. Management of V-2 areas is intended to prevent activities or intensities of use that create further significant degradation of native plant or animal communities and encourage activities or intensities of use that are beneficial to those communities. Permitted activities may have a higher level of disturbance than in V-1 areas, provided they remain within sustainable levels. V-3 areas are managed to prevent activities or intensities of use that result in degradation of unique native species and secondary forest resources (water supply, erosion control & aesthetic values). Permitted activities may have high levels of disturbance, as long as they don't negatively impact remaining native plant populations and have an eventual net benefit to other resources like water or an improved vegetative cover for other activities. Native plant conservation may be focused at a species, rather than an ecosystem level. Management objectives for V-4 areas are to prevent activities or intensities of use that result in degradation of watershed cover or soils. These areas are where the most disruptive activities would be allowed, such as large-scale commercial forestry, game habitat manipulation, etc. Native plant conservation is mainly focused at the species level. DOFAW is in the process of updating its Management Guidelines.

Rare Plants: Kaua'i has a high level of biological endemism (Mitchell et al. 2005) and has many rare plants, some of which are found within Halele'a Forest Reserve (Table 4 and Figure 6). In addition to the 274 plant species previously listed with the US Endangered Species Act (US-ESA) in the State of Hawai'i, an additional 45 plants endemic to Kaua'i have recently been approved for listing (U.S. Fish and Wildlife Service 2010). A small enclosure protecting *Pritchardia viscosa* exists off Powerline Trail. Another small population of *Pritchardia* sp. exists in Wai'oli Valley.

The Plant Extinction Prevention Program (PEP)'s mission is to protect Hawai'i's rarest native plants from extinction. PEP works to reverse the trend toward extinction by managing wild plants, collecting seeds and establishing new populations, focusing on species that have fewer than 50 plants remaining. Funding for the PEP Program is provided by DOFAW, US Fish and

Figure 4: Vegetation at Halele`a Forest Reserve (Hawai`i GAP Analysis Program 2005) 15

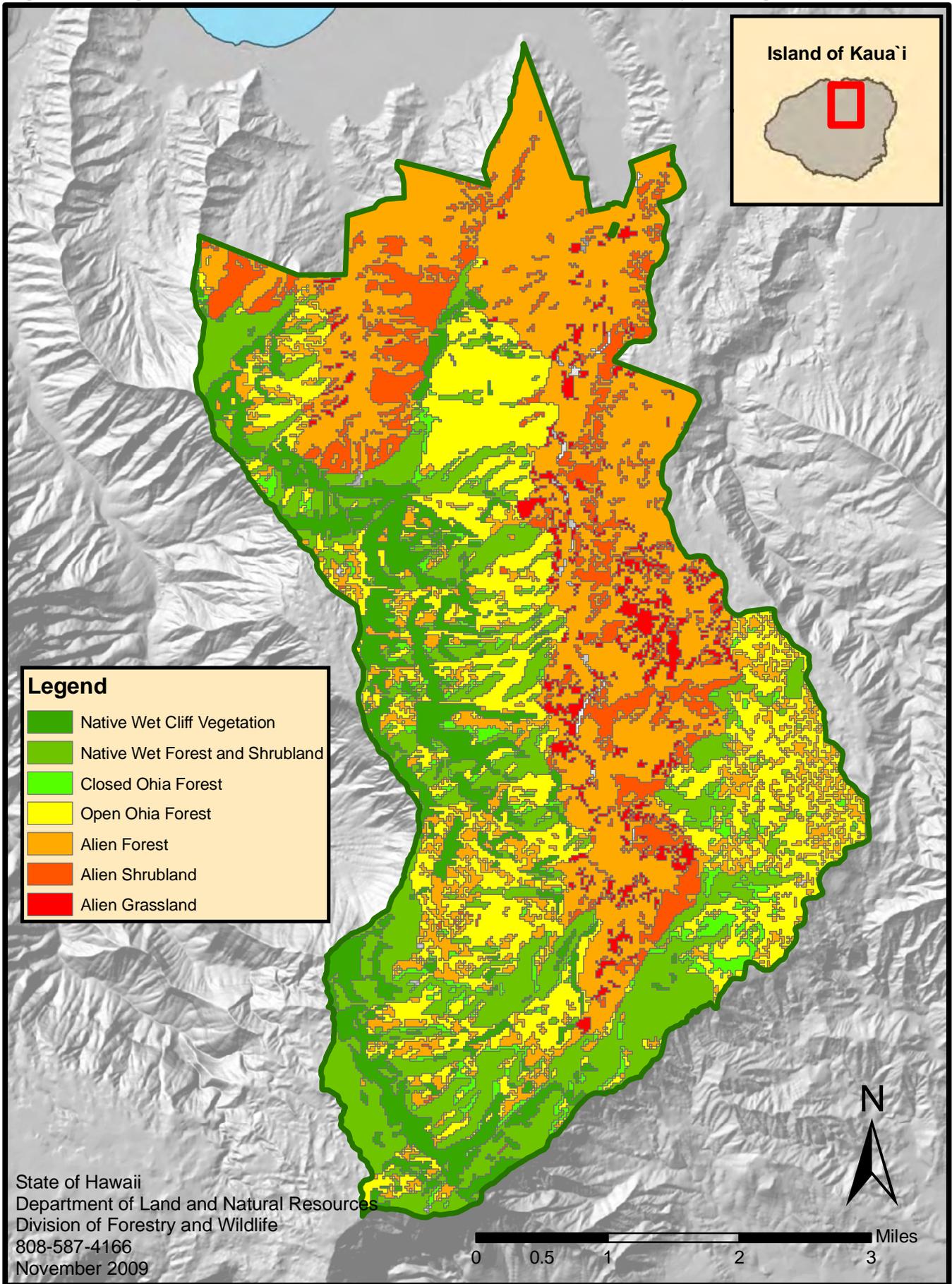
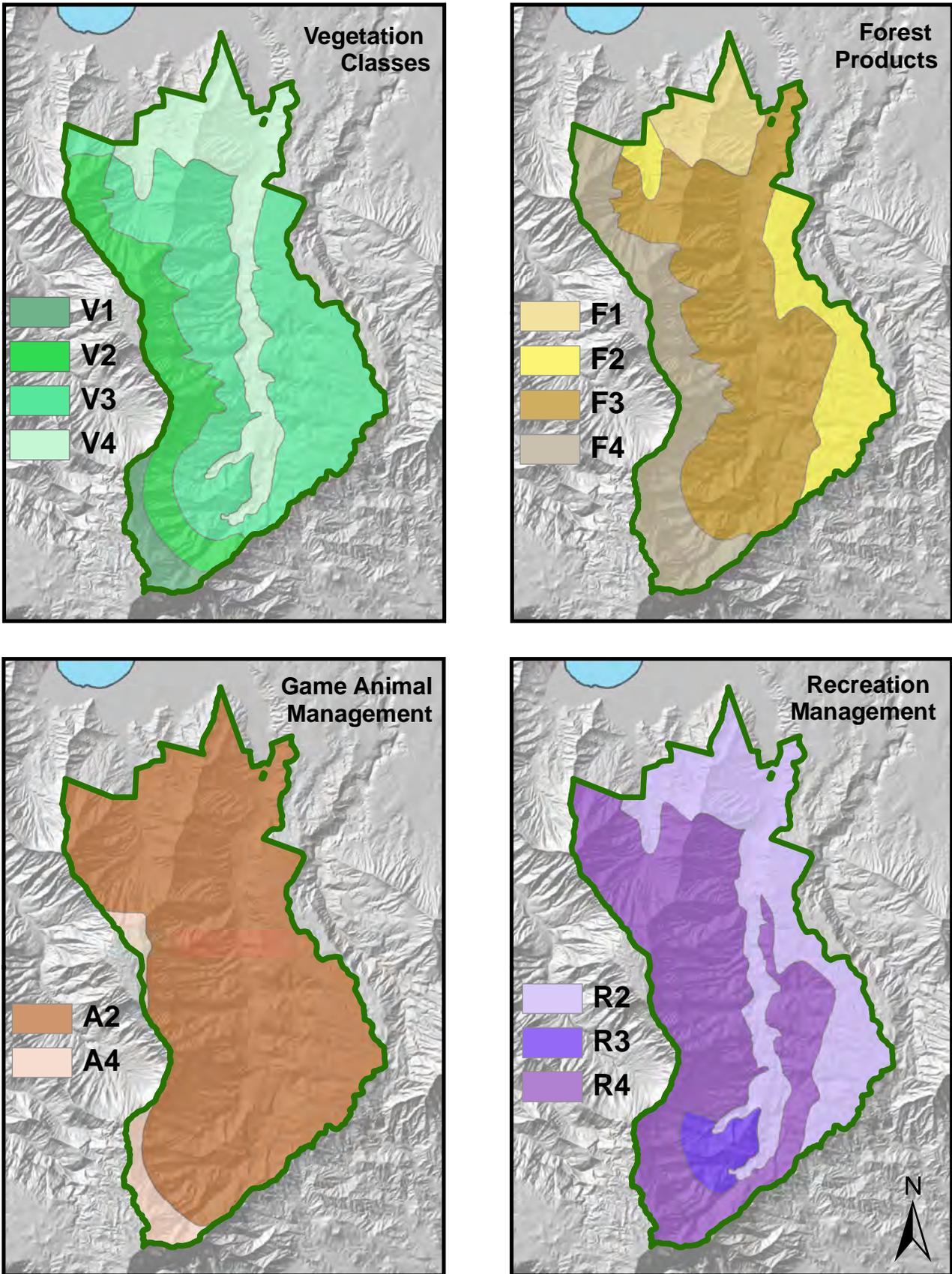


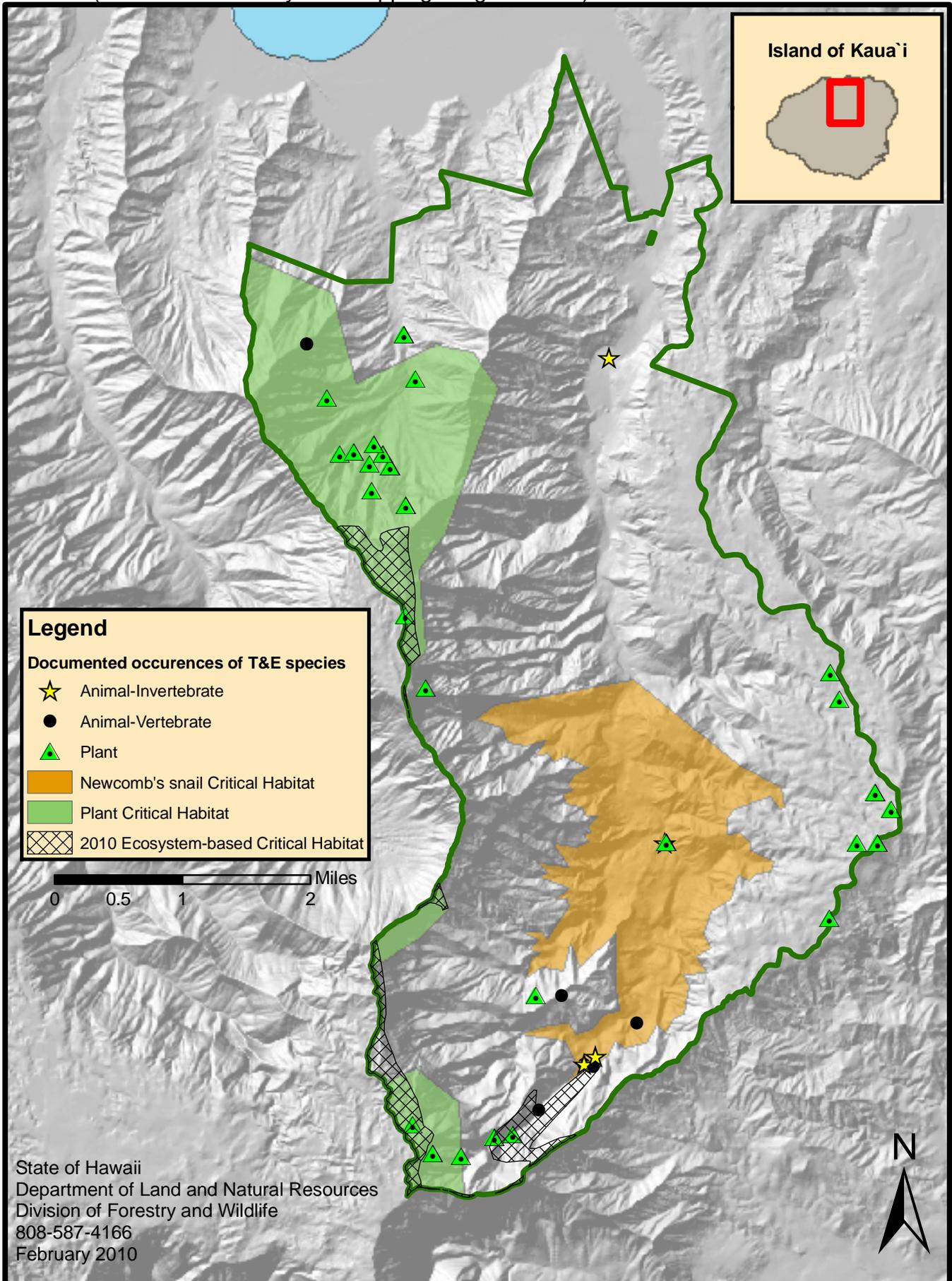
Figure 5: Halele`a Forest Reserve - DOFAW's 2001 Draft Management Guidelines



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February 2010
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0 0.5 1 2 3 4 5 Miles

Figure 6: Threatened & Endangered (T&E) Species and Critical Habitat in Halele`a Forest 17 Reserve (Hawai`i Biodiversity and Mapping Program 2008)



Wildlife Service (USFWS) and other federal, state, and private partners. Members of the Hawai‘i Rare Plant Restoration Group, of which DOFAW is a founding member, provides oversight to PEP and provides botanical expertise when necessary. The PEP Program regularly collaborates with over 60 conservation partners and landowners to protect PEP species under their jurisdiction.

Table 4: Rare and endangered plants and animals observed within Halele‘a Forest Reserve (Hawai‘i Biodiversity and Mapping Program 2008). Species listed may have more than one observation. An observation is considered historical if it occurred more than 30 years ago. Also see Figure 6.

| | Species | Current/ Historical | US-ESA Listing Status | PEP Species? |
|---------------|--|------------------------|--------------------------|-----------------|
| Plants | <i>Adenophorus periens</i> | Current | Endangered | Yes |
| | <i>Bidens campyoltheca</i> sbsp. <i>campyoltheca</i> (ko‘oko‘olau, koko‘olau) | Current | Species of concern | Yes |
| | <i>Chamaesyce remyi</i> var. <i>hanaleiensis</i> (‘akoko, koko, kokomalei) | Historical | Species of concern | No |
| | <i>Chamaesyce remyi</i> var. <i>remyi</i> (‘akoko, koko, kōkōmālei) | Current | Candidate | No |
| | <i>Cyanea parvifolia</i> (‘ōhā, hāhā, ‘ōhā wai) | Historical | Species of concern | No |
| | <i>Cyanea recta</i> (‘ōhā, hāhā, ‘ōhā wai) | Historical/ current | Threatened | No |
| | <i>Cyrtandra cyaneoides</i> (ha‘iwale, kanawao ke‘oke‘o) | Current | Endangered | No |
| | <i>Cyrtandra kealiae</i> subsp. <i>kealiae</i> (ha‘iwale, kanawao ke‘oke‘o) | Historical | Threatened | No |
| | <i>Cyrtandra oenobarba</i> (ha‘iwale, kanawao ke‘oke‘o) | Historical/ current | Candidate | No |
| | <i>Cyrtandra pickeringii</i> (ha‘iwale, kanawao ke‘oke‘o) | Historical/ Current | Species of concern | No |
| | <i>Dubautia knudsenii</i> subsp. <i>knudsenii</i> (na‘ena‘e) | Current | n/a | No |
| | <i>Dubautia waialealae</i> (na‘ena‘e) | Current | Candidate | No |
| | <i>Gardenia remyi</i> (nānū, nā‘ū) | Historical/ current | Candidate | No |
| | <i>Hedyotis elatior</i> | Historical | n/a | No |
| | <i>Hedyotis fluviatilis</i> | Current | Candidate | No |
| | <i>Hesperomannia lydgatei</i> | Current | Endangered | No |
| | <i>Isodendron longifolium</i> (aupaka) | Current | Threatened | No |
| | <i>Joinvillea ascendens</i> var. <i>macraeana</i> | Historical/ current | Candidate | No |
| | <i>Keyseria erici</i> | Current | Candidate | No |
| | <i>Labordia helleri</i> (kāmakahala) | Current | Candidate | No |

| | Species | Current/ Historical | US-ESA Listing Status | PEP Species? |
|----------------|--|------------------------|--------------------------|-----------------|
| | <i>Labordia lydgatei</i> (kāmakahala) | Current | Endangered | Yes |
| | <i>Labordia pumila</i> (kāmakahala) | Current | Candidate | No |
| | <i>Lindsaea repens</i> var. <i>macraeana</i> | Historical | n/a | No |
| | <i>Melicope paniculata</i> (alani) | Historical | Candidate | No |
| | <i>Myrsine fosbergii</i> (kōlea) | Current | Candidate | No |
| | <i>Phyllostegia helleri</i> | Historical/ current | Species of concern | No |
| | <i>Phyllostegia wawrana</i> | Historical | Endangered | Yes |
| | <i>Pisonia wagnerniana</i> (pāpala kēpau) | Historical | Species of concern | No |
| | <i>Plantago princeps</i> var. <i>longibracteata</i> (ale) | Historical | Endangered | No |
| | <i>Platydesma rostrata</i> (pilo kea lau li‘i) | Current | Candidate | No |
| | <i>Pritchardia viscosa</i> (loulu) | Current | Endangered | Yes |
| | <i>Sceptridium subbifoliatum</i> (makou) | Historical | Species of concern | Yes |
| | <i>Wikstroemia hanalei</i> (‘ākia) | Historical | Species of concern | No |
| | <i>Wikstroemia skottsbergiana</i> (‘ākia) | Historical | Species of concern | Yes |
| Animals | <i>Anas wyvilliana</i> (koloa, Hawaiian duck) | Historic | Endangered | n/a |
| | <i>Atyoida bisulcata</i> (‘ōpaekala‘ole) | Current | n/a | |
| | <i>Awaous guamensis</i> (‘o‘opu nākea) | Current | n/a | |
| | <i>Erinna newcombi</i> (Newcomb’s snail) | Current | Threatened | |
| | <i>Hemignathus ellisianus</i> (Kaua‘i ‘akialoa) | Historic | Endangered | |
| | <i>Lentipes concolor</i> (‘o‘opu alamo‘o) | Current | n/a | |
| | <i>Macrobrachium grandimanus</i> (‘ōpae, ‘oeha‘a, Hawaiian prawn) | Current | n/a | |
| | <i>Neritina granosa</i> (hīhīwai, wī) | Current | Species of concern | |
| | <i>Puffinus auricularis newelli</i> (‘a‘o, Newell’s shearwater) | Historic | Threatened | |
| | <i>Sicyopterus stimpsoni</i> (‘o‘opu nōpili) | Current | n/a | |

Critical Habitat: US-ESA defines Critical Habitat as areas that may or may not be occupied by a threatened or endangered species, but are essential to the conservation of the species. These areas may require special management considerations or protection (16 U.S.C. § 1532 (5)). Halele‘a Forest Reserve currently contains approximately 2200 acres of Critical Habitat for 11 plant species and 2164 acres for the Newcomb’s snail (*Erinna newcombi*) (Figure 6). Critical Habitat has been revised for Kaua‘i (U.S. Fish and Wildlife Service 2010); some of these new areas fall within Halele‘a Forest Reserve. This newly-developed, ecosystem based approach adds to, rather than replaces, previous Critical Habitat designation. New Critical Habitat

designates the Forest Reserve as containing three of six ecosystem types: wet cliff, montane wet, and lowland wet. This new approach is intended to address common threats that occur across these ecosystems in order to focus conservation efforts on restoring the function of habitats shared by listed species.

Timber Species: Large scale harvesting of the Hawaiian forests began in 1791 with the sandalwood trade; this ultimately led to Hawaii's first conservation law in 1839, restricting the cutting of sandalwood (Nelson 1967). Forest loss continued due to cattle grazing and the need for fuel wood on whaling ships and in sugar mills. Eventually, sugar plantations began replanting efforts. The Territorial government also took an interest in exotic and native tree planting throughout the Hawaiian Islands, both for reforestation purposes and to conduct trials with commercially valuable timber species. Halele'a Forest Reserve has approximately 125 acres of plantations located in the makai region at Hanalei (Figure 7) (Klingensmith 1967); most of these were planted prior to 1957 (Honda et al. 1967).

DOFAW's Draft Management Guidelines designate Halele'a Forest Reserve as containing all four levels of forest products classification (Figure 5): Primary (F-1, forest products are a primary objective), Secondary (F-2, limited small scale harvesting or salvage is allowed), Personal (F-3, small scale non-commercial harvesting or salvage is allowed), and Restricted (F-4, forest products are not normally an objective). All classification levels have restrictions regulated by DOFAW and require appropriate permits and/or licenses.

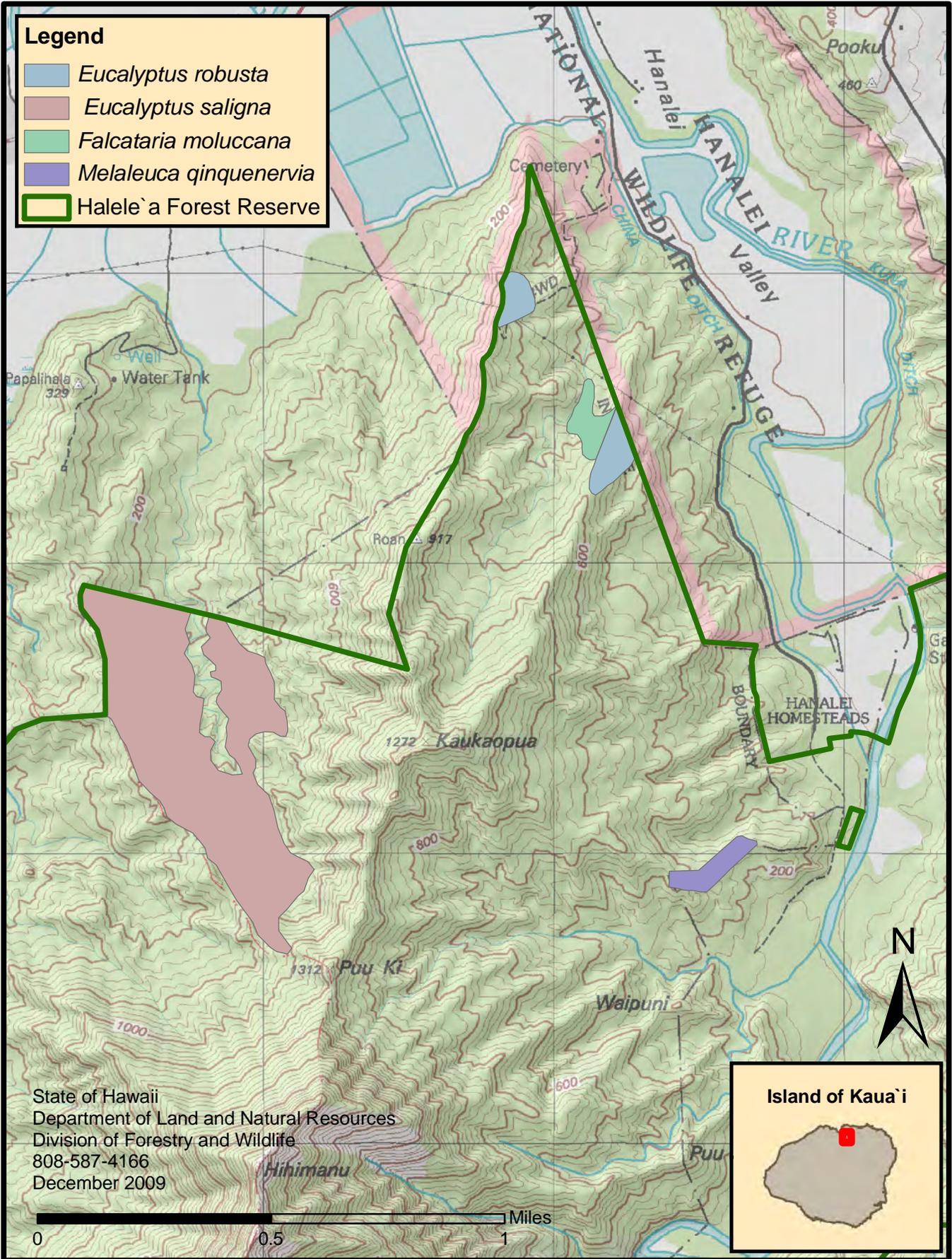
Invasive plant species: Weedy plants of concern in the Forest Reserve include Koster's curse (*Clidemia hirta*), Tufted beardgrass (*Schizachyrium condensatum*), Rose apple (*Syzygium jambos*), Shoebuttan ardisia, (*Ardisia elliptica*), Australian tree fern (*Sphaeropteris cooperi*), Red ginger (*Alpinia purpurata*), bamboo (*Phyllostachys* spp.), paperbark (*Melaleuca quinquenervia*), common guava (*Psidium guajava*), strawberry guava (*Psidium cattleianum*), cat's claw (*Caesalpinia decapetala*), and albizia (*Falcataria moluccana*).

F. Wildlife:

Native Wildlife: The wet valleys of Halele'a Forest Reserve provide habitat for a variety of native wildlife, including forest birds, sea birds, invertebrates, fishes, and likely Hawai'i's only native land mammal, the Hawaiian hoary bat (*Lasiurus cinereus semotus*).

The historic and current distribution of birds within Halele'a Forest Reserve is poorly known, though it certainly once was home to many native birds (P. Roberts, personal communication, unreferenced). There are currently eight native songbirds known to exist on Kaua'i, and an additional five that have not been seen recently and may be extinct. Those with known populations include 1) 'elepaio (*Chasiempis sandwichensis sclateri*), 2) federally endangered puaiohi (*Myadestes palmeri*), 3) Kaua'i 'amakihi (*Hemignathus kauaiensis*), 4) 'anianiau (*Magumma parva*), 5) federally endangered 'akikiki (*Oreomystis bairdi*), 6) proposed federally akeke'e (*Loxops caeruleirostris*), 7) 'i'iwi (*Vestiaria coccinea*) and 8) 'apapane (*Himatione sanguinea*). Species that have not been seen for at least ten years and are possibly extinct include: 1) kāma'o (*Myadestes myadestinus*), 2) Kaua'i 'ō'ō (*Moho braccatus*), 3) 'ō'ū (*Psittirostra psittacea*), 4) 'akialoa (*Hemignathus ellisianus procerus*), 5) Kaua'i nukupu'u

Figure 7: Historic plantations at Halale`a Forest Reserve - Hanalei (Klingensmith 1967)



(*Hemignathus lucidus hanapepe*). The distributions of all these species prior to the 20th century is very poorly known, but certainly encompassed most or all of the island. Since the introduction of mosquitoes in 1826 and the subsequent introduction of more mosquito species and several mosquito-borne diseases that cause widespread mortality in native songbirds, the native forest birds have been relegated to high elevations, generally above 3,500 ft.

Island-wide bird surveys conducted between 1968-1973 by John Sincock of USFWS (USFWS 1983), included one location within Halele‘a at the back of the Hanalei valley, as well as two locations bordering on the east and western edges of the Reserve (USFWS 1983). The survey site within Halele‘a was at roughly 1700 ft elevation, much lower than the current distribution of native songbirds. At that site the only native birds detected during the survey were the federally endangered koloa (Hawaiian duck, *Anas wyvlliana*), koa‘e kea (white-tailed tropicbird, *Phaethon lepturus*) and ‘auku‘u (black-crowned night heron, *Nycticorax nycticorax*). It is not surprising that native songbirds were not detected in the survey, although historically they undoubtedly occupied most or all of the Halele‘a Forest Reserve. The survey site bordering the Reserve to the west was located at the top of Nāmolokama at 4300 ft. Here, the native birds detected included ‘apapane, ‘elepaio, ‘anianiau, Kaua‘i ‘amakihi and akeke‘e. The survey site located just east of the Reserve was at 1850 ft. elevation, and native birds detected were ‘apapane, ‘elepaio, koa‘e kea, and kōlea (Pacific golden-plover, *Pluvialis fulva*). No surveys for songbirds within or near Halele‘a have been conducted since. Hawai‘i’s Comprehensive Wildlife Conservation Strategy (Mitchell et al. 2005) is a good reference for more information on forest birds.

Based on the elevational limits of songbird distribution within other high elevation areas of Kaua‘i such as the Alaka‘i Wilderness Preserve in the Nā Pali-Kona Forest Reserve, all species of native songbirds present within Halele‘a are expected to occur above 3500 ft elevation along the west and southwestern edges of the Reserve. There is some evidence that ‘elepaio occur down to 2000 ft within Kalalau Valley on Kaua‘i (unpublished data), and thus may have developed some resistance to the mosquito-borne diseases. If this is the case, ‘elepaio may also occur within native-dominated forest zones above roughly 2000 ft within Halele‘a Forest Reserve. Preservation of the native-dominated forest above 3500 ft elevation is crucial to preserving native bird habitat.

Native seabirds may also be found in the Forest Reserve (N. Holmes, personal communication, unreferenced). Hanalei, Lumaha‘i and Wainiha valleys are known to have the highest ornithological radar passage rates on Kaua‘i (DOFAW unpublished data, Day et al. 2003). Correspondingly, the resort community of Princeville at the base of the ahupua‘a of Hanalei receives a high proportion of Newell’s shearwater fledgling fallout each year. These indirect measures suggest these valleys and hence Halele‘a Forest Reserve are likely to provide important breeding habitat for the threatened Newell’s shearwater (*Puffinus auricularis newelli*) and endangered Hawaiian petrel (*Pterodroma sandwichensis*). Further surveys are needed to confirm the locations of these colonies.

Invertebrates are generally poorly studied and hence, few studies have been conducted on most native Hawaiian insects and other invertebrates. It is likely that there are many more endemic invertebrates that have yet to be discovered in remote pockets of native forest. Kaua‘i is home to the extremely rare Fabulous green sphinx moth (*Tinostoma smaragditis*), and was likely once

included in the distribution of the endangered Blackburn's sphinx moth (*Manduca blackburni*). Native damselflies (*Megalagrion* spp. and *Telmatogeton* spp.) also occur in Halele'a Forest Reserve. *Drosophila sharpi*, one of over 100 species of Hawaiian picture-wing flies, was designated as an endangered species in 2010; *Drosophila attigua* is among the species proposed for listing by the US-ESA.

Native aquatic life is well represented in Halele'a Forest Reserve. Wai'oli Stream is home to both native crustaceans (*Atyoida bisulcata* and *Macrobrachium grandimanus*) and fishes (*Awaous guamensis*, *Gobiidae* sp., *Kuhlia sandvicensis*, *Kuhlia* sp., and *Sicyopterus stimpsoni*). Hanalei River hosts the same native crustaceans and fish as Wai'oli Stream plus two additional fish species (*Lentipes concolor* and *Stenogobius hawaiiensis*) and a snail (*Neritina granosa*) (Parham et al. 2008).

Non-Native Wildlife: A wide variety of introduced songbirds exist across the island of Kaua'i; some of these provide competition for resources and serve as reservoirs for diseases that affect native bird populations. Introduced stream fauna is well documented; non-native crustaceans, fish, snails, and insects exist in the waters of Halele'a Forest Reserve. Mosquitoes, especially *Culex quinquefasciatus*, are a concern due to their status as disease vectors. Other non-native wildlife that may commonly be found in the area include the bull frog (*Rana catesbeiana*), neotropical toad (*Bufo marinus*), tree gecko (*Hemiphyllodactylus typus*), metallic skink (*Leiopisma metallicum*), rats (*Rattus* spp.), and mice (*Mus musculus*).

Introduced game animals, most of which have negative impacts on native ecosystems, are described below in Section J: Additional Public Use.

G: Access:

Vehicular Access: Halele'a Forest Reserve can be reached from Kapaka Street or 'Ohiki Road (off Kuhio Highway). Minimal parking is available at both locations.

Trails: Na Ala Hele, the State of Hawai'i Trail and Access Program, manages two trails at Halele'a Forest Reserve (Figure 1). Hiking on undesignated trails is not recommended due to the potential for natural hazards.

- **Powerline Trail** follows a 13 mile electric transmission line maintenance route along the eastern edge of Halele'a Forest Reserve, starting at the Hanalei National Wildlife Refuge and ending near the Keāhua Forestry Arboretum in Līhu'e-Kōloa Forest Reserve. This trail is designated for hiking, equestrian, bicycle, or motorcycle use. It is not regularly maintained by DOFAW and there are no amenities.
- **Okolehau Trail** travels 2¼ miles from the U.S. Fish and Wildlife Service parking area off Ohiki Road in Hanalei Valley to Kaukaopua, where there are views of the entire valley and Hanalei Bay. This is a moderately difficult trail that is currently maintained by a variety of volunteer groups, including the Hanalei Watershed Hui.

Designated Helicopter Landing Zones: None.

Restricted Watershed: No restricted watershed areas exist on the island of Kaua'i.

H: Infrastructure: Infrastructure in Halele‘a is limited, consisting mostly of trails and stream-related structures. Powerline Trail, described further in Section G: Access above, is the only maintained trail in the Forest Reserve. Hunter checking stations exist at Hanalei Valley and Princeville Powerline (Figure 1). Two tunnels exist deep in Hanalei Valley: the Hanalei Tunnel diverts water from the Hanalei River basin through to the Wailua River basin and the Ka‘apoko Tunnel diverts additional water from the Ka‘apoko tributary of the Hanalei River into the Hanalei Tunnel (Wilcox 1996). These tunnels were built from 1926-1928 to supply water to sugar plantations in east and south Kaua‘i. The US Geological Service also maintains three stream gauges in the Forest Reserve: mauka and makai on Hanalei River and one on Wai‘oli Stream. Placement of monitoring stations, including rain gauges, weather stations, soil moisture sensors, and throughfall measurement systems, are being planned by the Hanalei Watershed Hui for six locations in Hanalei Valley.

I: Archaeological and Historical Sites: Halele‘a Forest Reserve contains several archaeological sites. Approximately eight miles up Hanalei Valley lies Ka‘apoku Heiau (Bennett 1931). Across the river from the heiau is the remains of a village with house sites, a ditch and lo‘i. Downstream is another heiau and house sites at Kalama-iki, an old village on the river flats about four miles up the valley. There are also three unidentified sites in the makai region along the boundary with the Hanalei National Wildlife Refuge (Office of Hawaiian Affairs GIS layer). If any other archaeological or historic sites are discovered while conducting management activities, DOFAW shall stop work in the immediate area and notify the State Historic Preservation Division, as required by HRS Chapter 6E.

J. Additional Public Use:

Hunting: DOFAW manages public hunting on all forest reserve lands on Kaua‘i by the regulation of hunting seasons, bag limits, and varied hunting methods. DLNR’s Division of Conservation and Resources Enforcement (DOCARE) carries out enforcement of hunting regulations (HAR Chapter 122 Rules Regulating Game Bird Hunting, and Chapter 123 Rules Regulating Game Mammal Hunting). General hunting regulations can be found in HRS Title 13 Chapter 121. Halele‘a Forest Reserve contains two of four possible Game Animal management classes (Figure 5) according to DOFAW’s 2001 Draft Management Guidelines: A-2: Mixed Game and Other Uses and A-4: Game Control (supervised). In A-2 areas, game management is an objective integrated with other uses. Habitat may be manipulated for game enhancement and game populations are managed to acceptable levels using public hunting. A-4 areas are designated for animal removal only by staff or agency designees due to environmental sensitivity, remoteness, or public safety. Both the hunting regulations and the Draft management Guidelines are currently being revised. Management guideline revisions will likely amend most of the Forest Reserve to A-3: Game Control (public). In these areas resource protection is the primary objective, with emphasis on native plant communities and watersheds. Seasons and bag limits are designed for public hunting to reduce impacts to native resources.

As part of Hunting Unit C, mammal hunting is allowed in Halele‘a Forest Reserve but game bird hunting is not. Game mammals that occur in Halele‘a Forest Reserve include feral goats (*Capra hircus hircus*) and pigs (*Sus scrofa scrofa*). Although the area does not provide suitable habitat for many game birds, Lace-neck/spotted doves (*Streptopelia chinensis*) and Barred doves

(*Geopelia striata*) are common. Wild chickens (*Gallus gallus*) may be heard in the valleys and Ring-necked pheasants (*Phasianus colchicus*) are sometimes seen in grassy openings along Powerline Trail.

Camping: No overnight camping is allowed in Halele‘a Forest Reserve.

Fishing: Freshwater fishing is allowed in the Hanalei River; game fish present include ‘o‘opu, small mouth bass, tilapia, and prawns.

Hiking: Hiking is available along the Powerline Trail, a 13 mile trail that is best attempted in dry weather. It is an all day hike with an elevation gain of 1568 feet, where it is steep, eroded, and slippery at the saddle. Look out for bicycles, horses, and motorcycles, which are also allowed on the trail. Okolehau Trail is a hiking-only trail with an elevation gain of 1232 feet over its 2¼ mile length. See Section G: Access above for more details.

Horseback Riding: Horseback riding is allowed on the Powerline Trail.

Dirt Bikes, All Terrain Vehicles (ATVs) and Mountain Bikes: Mountain bikes are allowed on Powerline Trail, as are dirt bikes if they are registered by the County Division of Motor Vehicles. No bikes of any type are allowed on Okolehau Trail. ATVs are not allowed in Halele‘a Forest Reserve.

Non-Timber Forest Product Collection: Non-timber forest products may be collected within the Reserve. Examples include:

- a. Ferns
- b. Flowers
- c. Fruits
- d. *Psidium* spp. (guava) poles
- e. *Alyxia oliviformis* (maile)
- f. *Melicope anisata* (mokihana)
- g. Bamboo

Gathering of material from plant species that are not on Federal or State threatened and endangered species lists is permitted and regulated by DOFAW through standard Forest Reserve System permit procedures. Gathering of plant materials from threatened, endangered, or other equally rare species may be allowed if individuals have obtained a special permit from the DLNR Administrative office in Honolulu and/or a permit from the PEP program. Harvesting permits are required for gathering the items listed above. Permit applications for gathering plant material can be obtained from the DLNR Lihue office at 3060 Eiwa Street, Room 306, Lihue, Hawai‘i 96766; phone (808) 274-3433. These permits are available, upon approval, free (for common personal use items) of charge or at a fee, depending on the purpose. Public use permits available in conjunction with the Forest Reserve System are described in HAR §13-104.

Picnicking: Halele‘a Forest Reserve has no designated picnic areas.

General Recreation: Halele‘a Forest Reserve contains three of four possible Recreation Management classes according to DOFAW’s 2001 Draft Management Guidelines (Figure 5): R-2 (Medium Use Areas), R-3 (Light Use Areas), and R-4 (Restricted Areas). R-2 areas are where outdoor recreation is limited or controlled, or where it may be integrated with other uses. Facilities are not highly developed and include trails, rustic shelters, or unimproved campsites. R-3 designates areas where recreation is limited to certain areas or to occasional use due to impacts on resources or programs. Trails are the main recreational feature, and their use may be restricted. R-4 areas are where outdoor recreation is heavily restricted or controlled, if permitted at all. Trails would be the main feature considered. Areas may be classified “restricted” due to hazardous conditions, fragile ecosystems, limited accessibility or other management practices incompatible with recreational activities. These Draft Management Guidelines are currently being updated.

K. Threats:

Plants: Invasive plants are an on-going problem in most natural areas in Hawai‘i. A list of plants that are a particular concern in Halele‘a Forest Reserve can be found in Section E: Vegetation above. Current management focuses on weed control along trails.

Animals: Ungulates including goats and pigs contribute to native habitat degradation. Mosquitoes, including *Culex quinquefasciatus*, the primary vector of avian malaria (*Plasmodium relictum*) and avian pox (*Poxvirus avium*) can breed in pig wallows. These two diseases have been devastating to native forest bird populations at mid and low elevations. Introduced birds are relatively resistant to these diseases, serving as reservoirs and providing competition for native birds. Feral cats and dogs and introduced barn owls prey on native birds and may carry parasites that affect other animals and/or humans. Feral cats also prey on nesting seabirds. Rats consume seeds of native plants and may carry zoonotic diseases, including leptospirosis and murine typhus.

Fire: Despite being a generally wet area, fire can be a risk in Halele‘a Forest Reserve. The Hanalei Fire of June 18-24, 1967, burned 2,950 acres from Hanalei River to Waipā Stream. With the help of a Soil Conservation Service emergency grant, the burned area was initially seeded with grasses and legumes to control soil erosion. The area has subsequently been planted with Eucalyptus. DOFAW is the primary responder for fires that may occur in Halele‘a Forest Reserve (Figure 8).

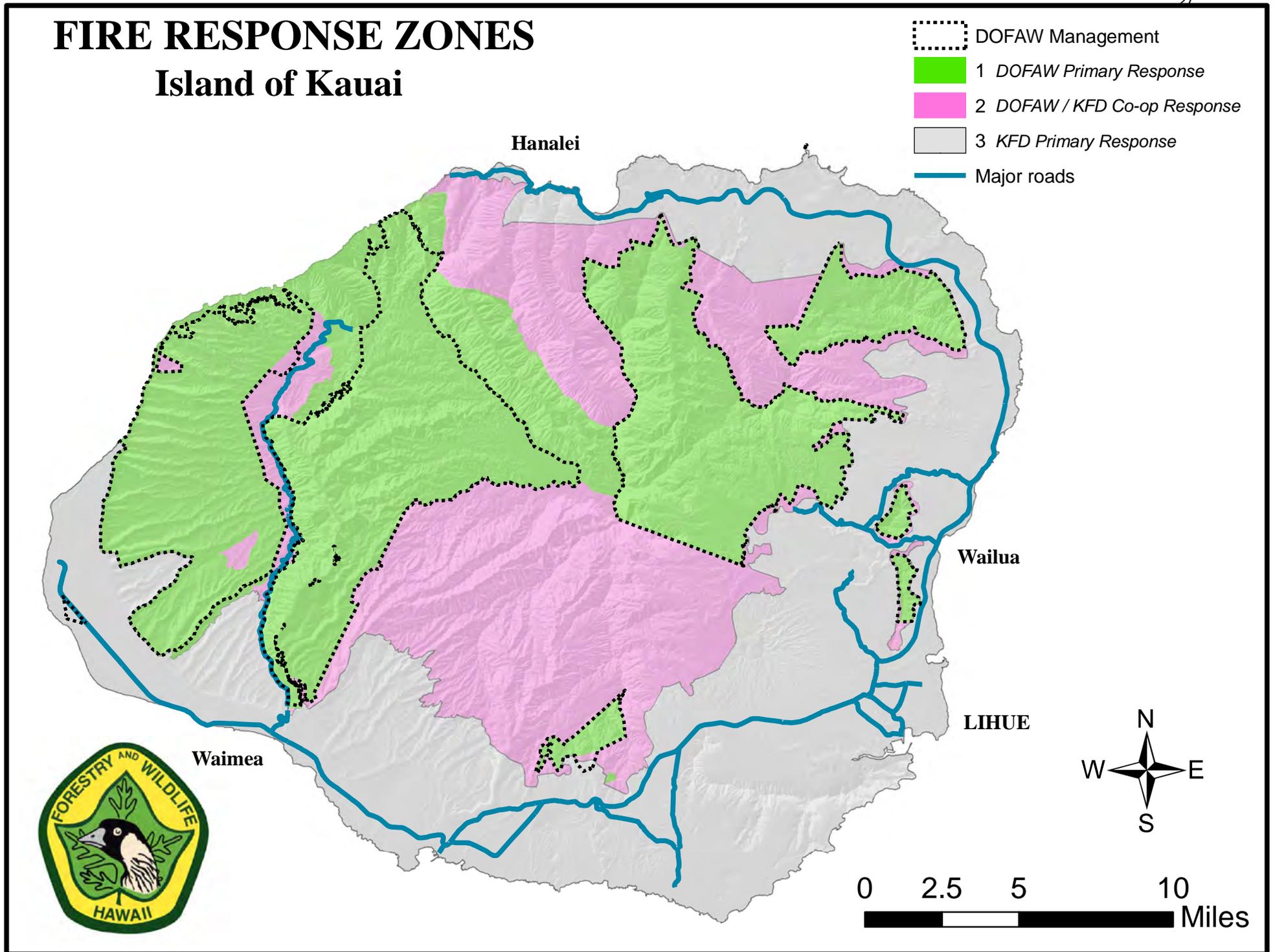
Flooding: The Hanalei River is prone to flooding during heavy rainfall events.

Other: Poaching of seed from listed *Pritchardia* spp. is an on-going problem.

L. Revenue:

According to Hawai‘i Revised Statutes §183.5, the department shall: “(5) Devise and carry into operation, ways and means by which forests and forest reserves can, with due regard to the main objectives of title 12, be made self-supporting on whole or in part.” DOFAW currently collects no revenue from Halele‘a Forest Reserve. Potential sources of revenue for the area are the use of Powerline Trail by commercial tour operators and utility easement rent.

Figure 8: Fire response zones for the island of Kaua'i



III. MANAGEMENT

A. Past Planning: A management plan for Halele‘a Forest Reserve was completed by Ralph Daehler, Kaua‘i District Forester, in 1970. Management units are specified as 1) Wainiha and 2) Wai‘oli-Hanalei and a status summary of private lands is also included. At the time, nearly all vegetation above 1200 feet was native cover and management was zoned to preserve this state as long as possible. Compatible uses for the lower sections, along with water and power production, were listed as fishing, hunting, and esthetic involved activities. A lack of access for public use is cited. Acquisition of adjacent private lands is listed as a desired goal for the Reserve. An interesting point in this historical plan was the proposed development of a scenic drive along Powerline Trail, linking Hanalei with Wailua.

A biological survey of Kamehemeha Schools lands that are immediately adjacent to the western boundary of Halele‘a Forest Reserve was conducted for the purpose of future management planning (Wood 2000). This survey is quite comprehensive and includes the areas of Lumaha‘i, Nāmolokama, and La‘au Ridge.

The Hanalei Watershed Hui (www.hanaleiwatershedhui.org) is a non-profit environmental organization that works with sustainability issues concerning the ahupua‘a of the area. This organization has been involved in coordinating different groups with an interest in Hanalei – a variety of information is available on their website.

The Kaua‘i Watershed Alliance (KWA) published the Kaua‘i Watershed Management Plan in 2005 (http://www.kauaiwatershed.org/KWA_management_plan.pdf). The KWA was formed in 2003 as a partnership between the major landowners, both public and private, of mauka conservation lands for the purpose of providing long-term protection of Kaua‘i’s upper watershed. The lands of Halele‘a Forest Reserve are included in this plan as Core 3 areas, which provide important buffer zones for KWA’s higher priority Core 1 and 2 management areas.

B. Summary of Existing Management Activities: Current management activities in Halele‘a Forest reserve include:

- Management of Okolehau Trail
- Monitoring invasive plants/animals
- Enhancement of native rare plant resources – seed collection
- Maintenance of *Pritchardia* enclosure
- Management of the pig hunt

C. Management Objectives and Goals: In the Draft Umbrella Management Plan for each Branch of the Division, broad management priorities for each forest reserve were derived from the mandates that regulate DOFAW activities, including the Draft Management Guidelines and Administrative Rules, as well as input from Branch staff. These management priorities were divided into eight categories:

- Watershed Values (aquifer recharge and erosion control)
- Resource Protection (fire, insects, and disease)
- Invasive Species Control (incipient and established plants and animals)

- Threatened and Endangered (T&E) Species Management (Federally listed, State listed, and rare plants and animals)
- Native Ecosystems (landscape level protection)
- Game Animal Management (areas managed for public hunting and/or habitat enhancement for game animals)
- Commercial Activity (income generating activities such as timber, tours, etc.)
- Additional Public Activity (non-income generating uses, such as recreation, cultural activities, personal gathering, educational or research activities, and events among others)

Each category has been ranked on a qualitative scale of 1 to 8 with 1 as higher priority and 8 as lower priority. Table 5 is an excerpt from the Kaua‘i Forest Reserves Draft Umbrella Management Plan and lists qualitative rankings of the management priority categories for Halele‘a Forest Reserve.

Table 5: Halele‘a Forest Reserve and associated management priority categories.

| Forest Reserve Section Name | Resource Protection | Watershed Values | Invasive Species Control | T&E Species Mgmt. | Native Ecosystems | Game Animal Mgmt. | Commercial Activity | Additional Public Activity |
|-----------------------------|---------------------|------------------|--------------------------|-------------------|-------------------|-------------------|---------------------|----------------------------|
| Halele‘a | 4 | 1 | 3 | 5 | 2 | 6 | 8 | 7 |

Table 6 expands on these management priority categories, listing general management actions to address the objectives, along with tactical goals, action items, and estimated cost associated with these actions.

Table 6: Management objectives and associated plans for Halele‘a Forest Reserve.
Estimated cost refers to State funds.

| Management Priority | General Management Action | Tactical Goals | Action Items | Estimated Cost |
|---------------------------------|---|---|---|----------------------|
| Watershed Values | Reduce the threat and impact of erosion on reserve resources | Reduce ungulate numbers by increasing hunting pressure | Update hunting rules – increase number of hunting days and bag limits for pigs | Staff and mgmt costs |
| | Monitor watershed and ecosystem health | Conduct regular ecosystem monitoring to assess impacts of threats | Investigate possibilities for aerial and ground surveys, digital imagery, etc. | Staff and mgmt costs |
| Native Ecosystems | Protect existing native-dominated ecosystems | Manage threats addressed in plan | Support KWA’s management plan objectives | Staff and mgmt costs |
| | | | Investigate possibilities for strategic barrier fence along animal ingress routes at Nāmolokama | \$100,000 |
| Invasive Species Control | Reduce degrading impacts of biological agents on reserve | Implement surveys (ground and aerial) in strategic areas of forest reserve for populations of | Ground surveys along established trails and roadways | \$12,000/yr |

| Management Priority | General Management Action | Tactical Goals | Action Items | Estimated Cost |
|-------------------------------------|---|---|---|----------------------|
| | resources | invasive plant species. | Aerial surveys of remote sensitive habitat | \$1000+/hr |
| | | Conduct biocontrol of target invasive species in cooperation with Department of Agriculture/University of Hawai'i/US Forest Service | Clidemia (using leaf spot fungus <i>Colletotrichum gloeosporioides</i> f. sp. <i>clidemiae</i>) | \$20,000/yr |
| | | | Strawberry guava (on approval of pending Environmental Assessment for release of the scale insect, <i>Tectococcus ovatus</i>) | Staff and mgmt costs |
| Resource Protection | Reduce the threat and impact of insects and disease on reserve resources | Monitor occurrence and spread of plant pests and disease Support research for potential chemical and biocontrol agents | <ul style="list-style-type: none"> Ohia rust (<i>Puccinia psidii</i>) Two spotted leafhopper (<i>Sophonia rufofascia</i>) | \$7000/yr |
| | Reduce the threat and impact of fire on reserve resources | Conduct public outreach to increase fire prevention awareness | Smokey Bear site visits to schools, public events, etc. | \$3500/yr |
| | | | Replace Smokey Bear costume | \$2500 |
| | | | Replace and add Smokey Bear signs along at trailheads and along roadsides | \$500/yr |
| Increase enforcement support | Work with DOCARE to increase enforcement presence. | Support increase of enforcement personnel. | Staff and mgmt costs | |
| Additional Public Activity | Increase public access | Obtain easement for Wai'oli Valley | Identify specific location for easement – communicate with landowners | Staff and mgmt costs |
| | Continue provision of public recreational opportunities | Maintenance of Na Ala Hele trails | Monitor trails twice/year and conduct brush control as needed | Staff and mgmt costs |
| T&E Species Management | Protect occurrences of listed and rare plants | Maintain and create new plant exclosures as necessary | <i>Pritchardia</i> spp. Others as feasible | \$53,000/yr |
| | | Collect and propagate rare plants in cooperation with NTBG and PEP | | |

| Management Priority | General Management Action | Tactical Goals | Action Items | Estimated Cost | |
|-------------------------------|--|--|--|----------------------------------|-----|
| | Protect occurrences of listed and rare animals | Determine population extent of native animals | Conduct annual surveys to determine location of listed seabird nesting sites | \$10,000/yr | |
| | | | Conduct biennial surveys to determine Koloa habitat use and nesting | \$2500/2 yr | |
| | | | Support USGS bat surveys | \$20,000/yr | |
| Game Animal Management | Provide public hunting opportunities | Provide regular hunting under Chapter 123 | Increase hunting days and bag limits & revise draft management guidelines | Staff and mgmt costs | |
| | | | Conduct staff hunts as needed | Protected remote/sensitive areas | TBD |
| | | | Conduct annual animal surveys as needed | Collect and analyze harvest data | TBD |
| Commercial Activity | Generate income from commercial activities in the Forest Reserve | Provide opportunities for commercial tour operators on Powerline Trail | Mountain biking Hiking Horseback riding Dirt bikes | Staff and mgmt costs | |

D. Overall Measures of Success: Measures of success for individual forest reserve management plans can be derived from the State of Hawai‘i’s annual variance reports. Initial measures of success that may be applicable to Halele‘a Forest Reserve include:

- Miles of trail maintenance
- Miles of unpaved access road maintenance
- Number of volunteer service projects
- Number of game mammals harvested
- Number of commercial trail and road tours
- Number of commercial trail tour patrons
- Number of commercial trail operator permits issued
- Acres of public hunting grounds managed
- Acres of noxious plants controlled
- Acres of fire protection area
- Miles of fence constructed
- Miles of fence maintained
- Acres of enclosure developed
- Acres of enclosure maintained
- Number of rare, threatened, or endangered plant/animal species protected
- Number of special use permits issued
- Number of appurtenant features maintained

IV. FUTURE RECOMMENDATIONS

A. Desired Outcome for the Forest Reserve: As Kaua‘i’s first Forest Reserve, Halele‘a was recognized as a special and important place long ago. Because the health of the watershed determines water quality, it is vital to maintain functional native ecosystems to protect the aesthetic and biological values of Hanalei Valley in order to continue to provide downstream users with water.

B. Future Recommendations: Opportunities for enhancements to Halele‘a Forest Reserve include a placement of an ungulate barrier fence at Nāmolokama, construction of enclosure fences for selected rare plants (especially *Pritchardia* spp.), and increasing public access at Wai‘oli.

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